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GENDER DIFFERENCES IN TREATMENT OUTCOMES AMONG
FIBROMYALGIA PATIENTS

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submitted in partial fulfillment of requirements for the degree

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DEDICATION

This thesis is dedicated to my mother who never stopped believing in me.

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ASHLEY A. HAAS

Abstract

Fibromyalgia is a chronic pain disorder that is characterized by widespread pain and additional somatic, cognitive, and mood symptoms. Although there is no cure for fibromyalgia and it greatly impacts the lives of affected individuals, the research on gender differences in fibromyalgia symptomatology has largely been inconsistent. No study, to date, has explored sustained outcomes in women versus men in the context of an interdisciplinary pain rehabilitation program (IPRP). This retrospective study of 163 (F=135, M=28) Cleveland Clinic Chronic Pain Rehabilitation Program participants investigated: 1) immediate and six month outcomes of fibromyalgia patients participating in an IPRP treatment and 2) whether there is a differential response to IPRP treatment across gender at discharge and six months following treatment. IPRP treatment produced both clinically and statistically significant improvements for both men and women in pain, mood, and function. Women maintained these improvements at six months following treatment. Men sustained statistically significant improvements but notable clinical improvements were only sustained for anxiety, stress, and pain. No gender differences were present for men and women at admission or discharge. At six months the only differences were that men reported more impairment related to functioning ($F=7.37, p=.007$), specifically in the areas of socialization ($F=9.09, p=.003$), occupation ($F=9.51, p=.002$), recreation ($F=11.11, p=.001$), and sexual activity ($11.75, p=.001$).

Further research is necessary to substantiate men's greater impairment of functioning following IPRP treatment and explore variables associated with such.

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CHAPTER I

LITERATURE REVIEW

1.1 Review of Relevant Literature

Although fibromyalgia is an incurable disorder that greatly impacts the lives of affected individuals, research regarding gender differences in symptomatology and long term outcomes after multidisciplinary treatment programs largely has been underinvestigated. Fibromyalgia is a chronic pain disorder that is characterized by widespread pain throughout the body. Individuals with the disorder often experience a combination of additional somatic symptoms, including fatigue, tenderness to touch or pressure, sleep problems, migraine or tension headaches, gastrointestinal difficulties such as irritable bowel syndrome, pelvic pain, an irritable or overactive bladder, and temporomandibular joint disorder (TMJ) (Crofford, 2013). Some individuals may also experience: depression, anxiety, and memory problems or difficulty thinking clearly (Crofford, 2013).

The diagnosis of fibromyalgia was previously based primarily on tender point counts, in the absence of other explainable causes for widespread pain. The 1990 American College of Rheumatology criteria for the classification of fibromyalgia

required the presence of at least 11 of 18 possible tender points at a sensitivity rating of mild or greater (see Table 1). Tender points include bilateral regions of the occiput, low cervical, trapezius, supraspinatus, second rib, lateral epicondyle, gluteal, greater trochanter, and knee (Wolfe et al., 1990) (see Figure 1). Tender points are assessed by the examiner palpating with either the thumb, first two fingers, or first three fingers at a pressure of approximately 4 kilograms (Wolfe et al., 1990). The tender points are considered to be mild if the patient complains of pain but does not grimace (defined as a “facial expression”), flinch (a “slight body movement”), or withdraw (move the area away from the examiner) (Wolfe et al., 1990). Moderate tender points are determined by the presence of either flinching or grimacing at the experience of pain, and severe ratings are given to patients who flinch or withdraw in an exaggerated manner. The last rating, unbearable, is reserved for patients who are unable to stand being touched and react with pain, even in the absence of palpation. Furthermore, individuals are required to have had pain for three or more months and no other disorder could better account for the pain (Wolfe et al., 1990).

In 2010 the American College of Rheumatology released alternate guidelines for diagnosis in order to encompass the evolving conceptualization of fibromyalgia with the addition of somatic and cognitive symptoms and removal of tender point count as the defining characteristic of the disorder (Wolfe et al., 2010) (see Table 2). The 2010 guidelines focus on two components: The Widespread Pain Index (WPI) and Symptom Severity (SS). The WPI is an assessment of pain for the past week in 19 areas throughout the body. The SS is a physician rated scale which specifies that symptoms must be present for at least three months at a similar level of pain or impairment (Wolfe et al.,

2010). Symptoms of fatigue, waking unrefreshed, and cognition are each rated on severity for the past week on a scale of 0 to 3. Scores of 0 denote no symptoms, 1 means slight or mild problems, 2 indicates moderate, considerable, and/or often present problems, and 3 refers to severe symptoms (Wolfe et al., 2010). Somatic symptoms are also rated on a scale of 0 to 3, indicating the number of symptoms the individual is experiencing: 0 indicates no symptoms, 1 is few symptoms, 2 indicates a moderate amount of symptoms, and 3 stands for many symptoms (Wolfe et al., 2010). Scores from the fatigue, waking unrefreshed, cognition, and somatic symptom scales are summed to a final score that ranges from 0 to 12 (Wolfe et al., 2010). The WPI and SS are used together for diagnosis, and the SS can be used independently to determine the severity of patients' symptoms. As with the 1990 criteria, there can be no other disorders that would better account for an individual's pain and symptoms (Wolfe et al., 2010).

Fibromyalgia occurs in approximately two to four percent of the population (Crofford, 2013). The 2008 estimate for adults with the disorder within the United States was five million (Lawrence et al., 2008). Historically, prevalence rates of fibromyalgia among women and men varied considerably, with rates for women ranging from 3.4% to 4.9% and men ranging from 0.2% to 1.6% (Mas et al., 2008; White et al., 1999; Wolfe, Ross, Anderson, Russell, & Hebert, 1995). A recent study found that fibromyalgia was underdiagnosed in men at a 20-fold rate when comparing community based diagnoses with survey criteria (Vincent et al., 2013). The inconsistency in prevalence rates may be attributed to recent changes in diagnostic criteria or problems inherent with previous criteria (Wolfe et al., 2013).

Although clinical populations remain predominately female, recent prevalence rates for women and men are similar, 2.4% and 1.8% respectively (Wolfe, Brähler, Hinz, & Häuser, 2013). The recent shift to similar prevalence rates between men and women can be attributed to the use of the 2010 criteria for the diagnosis of fibromyalgia. Accordingly, the 1990 criteria's emphasis on tender point counts resulted in men being underdiagnosed with fibromyalgia, since women have been shown to have a greater number of tender points than men and have a significantly lower pain threshold than men (Castro-Sánchez et al., 2012; Häuser et al., 2011; LeResche, 2011; Vincent et al., 2013; Yunus, Inanici, Aldag, & Mangold, 2000).

Fibromyalgia greatly impacts the lives of affected individuals and carries stark societal costs. The mean annual direct and indirect costs related to the disorder within the United States have been estimated at \$10,219 to \$42,456 per individual (Chandran et al., 2012). Furthermore, costs increased based on the severity of the disorder, along with corresponding medication use, emergency room visits, office visits to a physician, reduction of scheduled work time, days missed from work, and unemployment (Chandran et al., 2012).

The cause of fibromyalgia is uncertain. The current consensus is that its etiology is multifactorial. Psychological risk factors include childhood physical, sexual, and emotional abuse and living in a household as a child or adolescent with an individual who was depressed (Olivieri, Solitar, & Dubois, 2012). Other factors associated with the disorder include: genetic, immunological, and hormonal susceptibilities, and autonomic nervous system and/or central nervous system dysfunction, such as central sensitization (Bellato et al., 2012; Meeus & Nijs, 2007).

There is no cure for fibromyalgia. Treatments that seek to alleviate symptoms of the disorder vary considerably from pharmacologic to non-pharmacologic treatments (Bellato et al., 2012). Pharmacologic treatments that are moderately effective for the treatment of fibromyalgia include: tramadol (Ultram), duloxetine (Cymbalta), milnacipran (Savella), amitriptyline (Elavil), cyclobenzaprine (Flexiril), fluoxetine (Prozac), and pregabalin (Lyrica) (Häuser, Thieme, & Turk, 2010). Moderately effective non-pharmacologic treatments are patient education, aerobic exercise, strength training, biofeedback, and psychological interventions, such as cognitive behavioral therapy (Ablin et al., 2013; Häuser, Thieme, & Turk, 2010). However, pharmacologic and non-pharmacologic approaches are minimally effective as stand-alone treatments for the long term management of fibromyalgia symptoms; therefore, multidisciplinary or interdisciplinary approaches that incorporate both pharmacologic and non-pharmacologic aspects of treatment are necessary to effectively treat the disorder (Carville et al., 2008; Crofford, 2013; Häuser et al., 2010; Marcus, 2009).

A multidisciplinary treatment approach incorporates health care providers from numerous disciplines who are working toward the common goal of improving clients' symptoms and quality of life (Townsend, Bruce, Hooten, & Rome, 2006). Compared to standard medical care, a multidisciplinary rehabilitation approach repeatedly has been shown to be more effective at improving symptoms, health status, pain intensity, degree of disability, and mood for individuals with fibromyalgia, though research has primarily been obtained for the efficacy of treatment on women (Anderson & Winkler, 2006; Carbonell-Baeza et al., 2011; Lemstra & Olszynski, 2005).

Interdisciplinary pain rehabilitation programs (IPRPs) are a type of multidisciplinary treatment approach in which a team of professionals across various disciplines, such as neurologists, psychiatrists, psychologists, nurses, social workers, physical therapists, occupational therapists and vocational rehabilitation counselors, work together in a coordinated, team-like environment to provide medical, physical, occupational, and psychological therapies to patients with chronic pain. The aim of such programs is to teach self-management for a chronic, incurable condition and to increase functioning for such patients. Empirical reviews support the efficacy of IPRPs for patients with fibromyalgia through significant improvements in pain, mood, function, and health care utilization by effectively reducing pain, distress, physical impairment, anxiety, and depression (Turk, Okifji, Sinclair, & Starz, 1998). While findings for improvements in pain, mood, and functioning have been shown at 3 to 12 month follow-up (Angst, Brioso, Main, Lehmann, & Aeschlimann, 2006; Martin et al., 2012), research has not yet substantiated long-term benefits of IPRPs for fibromyalgia. Further research is therefore necessary to provide additional support for the long-term benefits and sustainability of benefits of an IPRP for individuals with fibromyalgia.

1.2 Gender Differences among Fibromyalgia Patients

A substantial amount of research exists that supports gender differences in the experience of pain (Hirsh, Waxenberg, Atchison, Gremillion, & Robinson, 2006; Keogh & Herdenfeldt, 2002; Paller, Campbell, Edwards, & Dobs, 2009). As fibromyalgia is a chronic pain disorder that is characterized by persistent, widespread pain, one would

expect that gender differences exist among affected individuals. This area of research, however, has largely been underinvestigated.

A literature review was conducted to compare studies that explored gender differences among individuals with fibromyalgia. This review focused on studies that had either been written in or translated into English. A total of 10 studies met these criteria. Gender differences in fibromyalgia predominately have focused on three areas of symptom differentiation: pain, mood, and function. Gender differences for pain previously focused on pain severity, pain intensity, current pain, and pain in the past two weeks. Mood differences for men and women have looked at stress, depression, and anxiety scores. Functioning differences for men and women have involved physical, emotional, and social functioning levels, life interference due to pain, and disability ratings. Despite a common belief that gender differences in fibromyalgia have been well established, studies reported extremely inconsistent findings for males and females related to pain, mood, and function.

1.2.1 Gender Differences and Pain

Four studies found no differences in fibromyalgia pain as a function of gender (Aparicio et al., 2012; Gormson, Rosenberg, Bach, & Jensen, 2010; White, Speechley, Harth, & Østbye, 1999; Yunus et al., 2000). In contrast, two studies did find gender differences in fibromyalgia pain, and the results were mixed. Buskila, Neumann, Alhoashle, and Abu-Shakra (2000) found that men reported significantly higher current pain. However, a recent study by Castro-Sanchez et al. (2012) found that women experienced greater pain intensity than men.

1.2.2 Gender Differences and Mood

Studies exploring mood in individuals with fibromyalgia similarly reported varied results. Five studies found no differences in mood across gender (Aparicio et al., 2012; Gormsen et al., 2010; Häuser et al., 2011; White et al., 1999; Yunus, Celiker, & Aldag, 2004). Three studies, conversely, found differences in gender for mood. Buskila et al. (2000) found that men had higher rates of depression than women. The study by Castro-Sánchez et al. (2012), however, contradicts these findings, as women had significantly higher depression scores than men. Consistent with the findings of Castro-Sánchez et al., a 2007 national epidemiologic study of depression and chronic pain conditions in Canada found that women with fibromyalgia had almost double the prevalence rates of depression than men (23.7% and 13.9% respectively) (Munce & Stewart).

1.2.3 Gender Differences and Function

Findings of gender differences in functioning for fibromyalgia patients were also mixed. Three studies found no differences between men and women in terms of functioning (Gormsen et al., 2010; White et al., 1999; Yunus et al., 2000). In contrast, three studies found that men had greater impairment in functioning than women (Aparicio et al., 2012; Buskila et al., 2000; Castro-Sánchez et al., 2012). Among these three, inconsistencies for specific areas of impairment across pain-related functioning were present. Aparicio et al. (2012) found that men reported significantly more impairment related to the vitality subscale of the Short Form Health Survey-36 (SF-36), while Buskila et al. (2000) found that males had significantly more impairment on the

SF-36 subscale measuring role limitations related to emotional functioning. Castro-Sánchez et al. (2012) concluded that men reported experienced significantly more impairments on the physical function scale of the Fibromyalgia Impact Questionnaire.

1.2.4 Gender Differences in Pain Rehabilitation Programs

Only one study has been conducted to explore gender differences in a pain rehabilitation program setting. Hooten, Townsend, and Decker (2007) compared gender differences among fibromyalgia patients at program admission and discharge, unlike the cross sectional snapshots of the previous studies, and found no differences in pain or mood. In terms of functioning, they found that women had greater overall impairment in life interference due to pain upon admission and at discharge, specifically in the areas related to perceived health status and limitation in roles due to emotional interference. Additionally, women experienced significantly greater impairment in social functioning. Men, however, experienced less improvement in interference with life; therefore, at discharge they had more overall impairment due to pain (Hooten et al., 2007). This suggests that although women report greater impairments initially, men experience greater difficulties related to impairment and do not experience as many treatment gains related to functioning. Hooten et al. (2007) concluded that the investigation of post-treatment outcomes as necessary to ascertain whether gender differences among fibromyalgia patients are persistent upon discharge.

1.2.5 Inconsistencies among Previous Studies

Differences in populations, samples, and p -value significance levels of analyses within the previous studies may account for the above noted inconsistencies. Cultural, linguistic, and demographic differences may have affected the results as they were conducted in six countries. Five studies were conducted in North America (Hooten et al., 2007; Munce & Stewart, 2007; White et al., 1999; Yunus et al., 2000; Yunus et al., 2004), and five were conducted in European and Middle Eastern countries, which consisted of two in Spain, and one each in Israel, Germany, and Denmark (Aparicio et al., 2012; Castro-Sánchez et al., 2012; Gormsen et al., 2010; Häuser et al., 2011; Buskila et al., 2000; Gormsen et al., 2010, respectively). The studies also varied in terms of sample size, which ranged from 48 to 131,535 (Castro-Sánchez et al., 2012; Munce and Stewart, 2007) and involved both clinical (Aparicio et al., 2012; Buskila et al., 2000; Castro-Sánchez et al., 2012; Gormsen et al., 2009; Häuser et al., 2011; Hooten et al., 2007; Yunus et al., 2000; Yunus et al. 2004) and population based participants (Häuser et al., 2011; Munce and Stewart, 2007; White et al., 1999).

Additionally, p -value significance levels among the data analyses varied from $p < .05$ (Castro-Sánchez et al., 2012; Gormson et al., 2010; Häuser et al., 2011) to $p < .01$ (Yunus et al., 2010; Yunus et al., 2004). Variation of p -value significance may explain why some studies reported significant findings, while others reported findings that were not statistically significant. For example, Yunus (2004) used a p -value of $p < .01$ and determined that anxiety at $p < 0.02$ and stress at $p < 0.04$ were not significant. Castro-Sánchez (2012), however, used a p -value of $p < .05$ allowing mean pain at $p = .015$, disability at $p = .010$, and depression at $p = .013$ to be statistically significant. Likewise, using $p < .05$ allowed Buskila et al. (2000) to determine that current pain was significant at

$p=.029$, Aparicio et al. (2013) to conclude physical impairment was significant at $p=.017$, and Hooten et al. (2007) to identify significant results related to functioning ($p=.017$), health perception ($p=.023$), role-limitations physical ($p=.021$), and social functioning ($p=.033$).

1.3 Research Questions

The literature suggests that patients with fibromyalgia do improve (at least moderately) with interdisciplinary treatment approaches, but it is not known how such outcomes are maintained in the long term, and more specifically across genders. The present study seeks to explore the sustainability of IPRP treatment with specific attention to gender differences.

Since no previous study has explored gender differences in the long term outcomes (6 months) of fibromyalgia patients, it is unknown what outcomes such exploration may produce. Furthermore, only Hooten et al. have examined gender differences in an IPRP treatment approach. Because these findings have yet to be replicated, any conclusions about treatment effects can only be preliminary, and additional research is needed. Findings for clinical and population based cross sectional snapshot studies have produced inconsistent findings and, therefore, do not allow for any generalizations of gender differences among individuals with fibromyalgia.

Due to these reasons it is difficult to hypothesize what findings such an exploration of gender differences among long term outcomes of IPRP treatment may produce; therefore, the following research questions are posed. First, is IPRP participation beneficial for both women and men? In other words, do both men's and

women's symptoms improve from IPRP participation? Secondly, if men and women do improve from IPRP participation, are these improvements sustainable in the long term, follow-up period? Lastly, do differences across genders for IPRP fibromyalgia patients exist at either admission, discharge, or six month follow-up for pain, mood, and functioning? This study seeks to address these research questions, discuss the implications of findings, and explore the generalizability of findings to other interdisciplinary pain rehabilitation programs.

CHAPTER II

METHODS

2.1 Procedure

A retrospective study was conducted with patients of Cleveland Clinic's Chronic Pain Rehabilitation Program (CPRP). The study was approved by the Institutional Review Boards (IRBs) of Cleveland Clinic and Cleveland State University. The Cleveland Clinic's CPRP is an interdisciplinary pain rehabilitation day treatment program that lasts an average of three-and-a-half weeks. Participants attend the program five days per week (Monday to Friday) from 7:30 a.m. to 5:00 p.m. Program components include: physical and occupational therapies, coping skills training, individual and group psychotherapies (cognitive behavioral therapy, psychodynamic group therapy, family therapy and education, and biofeedback training), medication management including monitored weaning of patients from habituating medications, and substance use education, if indicated.

Patients within the program complete a packet of assessments measuring pain, mood, pain-related functioning, and other relevant psychological variables such as pain catastrophizing, and emotional expressiveness at admission, discharge, and six month

follow-up. Patients provide demographic information including age, marital status, and the number of years they have been experiencing pain. Patients undergo medical evaluation (including a physical exam) upon admission and assessments by physical and occupational therapists at admission and discharge. Patient admission, discharge, and six month follow-up scores for pain, mood, and pain-related functioning assessments were utilized in this study. The Numerical Rating Scale-11 was used as the measure of patient pain. Mood was assessed by the Depression, Anxiety, and Stress Scales-42 or the Depression, Anxiety, and Stress Scales-21. Impairments in functioning were approximated using patient scores from the Pain Disability Index. These instruments are described more fully below.

2.2 Participants

Patient data were obtained from fibromyalgia patients from January 1, 2006 to October 2, 2013 who were participating in the Chronic Pain Rehabilitation Program. Patients were diagnosed with fibromyalgia prior to or on admission to the CPRP based on a review of medical history and a physical examination conducted by a trained rheumatologist or pain physician using either the American College of Rheumatology's 1990 or 2010 criteria for fibromyalgia. Participants were excluded from the program if they were actively psychotic, using illicit drugs, dependent upon alcohol, had an untreated medical condition, or if they were thought to be at imminent risk for suicide. Follow-up data were obtained through mailed correspondence at six months following patient discharge. All correspondence was coded to allow patients to return follow-up material anonymously.

Of 615 fibromyalgia patients who completed the program during this time, 163 patients (females=135, males=28) completed the Depression, Anxiety, and Stress Scales, Pain Disability Index, and Numerical Rating Scale assessments for admission, discharge, and six month follow-up and were included in analyses.

2.3 Measurements

2.3.1 Pain Disability Index

The Pain Disability Index (PDI) is an 11-point Likert scale that ranges from scores of 0 (no disability) to 10 (worst disability) (see Appendix A). The PDI is a brief measure that addresses seven categories of interference in functioning: family and home responsibilities, recreation, social activity, occupation, sexual behavior, self-care, and life-support activities (Tait, Chibnall, & Krause, 1990). Total scores for the PDI are the sum of scores from all categories and range from 0 to 70. The PDI has demonstrated modest reliability for use as an assessment measure for chronic pain with a test-retest reliability of $r = 0.44$ and internal consistency of $\alpha = 0.86$. It has good validity with concurrent validity of $p < 0.05$ with the University of Alabama-Birmingham pain behavior scale patient ratings of grimacing and posturing and nurse ratings of patient complaints, body language, and non-verbal indications of pain and construct validity of Multiple $R = 0.74$ (Tait, Chibnall, & Krause, 1990).

2.3.2 Depression, Anxiety, and Stress Scale-42

The Depression, Anxiety, and Stress Scales-42 (DASS-42) are a 42-item self-report questionnaire designed to assess depression, anxiety, and stress (see Appendix B). The

DASS-42 has 14 items on each of the subscales (depression, anxiety, and stress). The DASS-42 was given to all patients from 2006 to 2011. Patients rated each item of the scales as either: 0 “did not apply to me at all,” 1 “applied to me to some degree, or some of the time,” 2 “applied to me to a considerable degree, or a good part of time,” or 3 “applied to me very much, or most of the time” (Psychology Foundation of Australia, 2013). Scores for each scale range from 0 to 42.

The DASS-42 has shown to be reliable with internal consistencies of $\alpha = .933$ for the depression scale, $\alpha = .897$ for the anxiety scale, stress scale of $\alpha = .933$, and total score of $\alpha = .966$ and shows temporal stability, obtained using paired *t*-tests to determine whether any significant differences were present between patients’ scores in a two week period since analysis of test-retest reliability would be unable to account for patient change between administration due to the possibility of patients scores naturally changing between the two week test-retest period (Brown et al., 1996; Crawford & Henry, 2007). It has demonstrated convergent validity for the depression scale with the Personal Disturbance Scale (sAD) depression scale at $r = .78$ and Hospital Anxiety and Depression Scale (HADS) depression scale at $r = .66$ and for the anxiety scale with sAD anxiety scale at $r = .72$ and HADS anxiety scale at $r = .62$ (Crawford & Henry, 2007).

The DASS-42 is valid for use in chronic pain with good convergent validity for the DASS depression scale with the Beck Depression Inventory at $r = .81$ and Profile of Mood States (POMS) Depression scale at $r = .84$ and the DASS anxiety scale with the POMS Tension scale at $r = .71$ (Scheman, Janotta, & Covington, 2007). Notably, the DASS-42 depression scale has demonstrated a possible ceiling effect when a large proportion of depressed patients received the maximum score (Page, Hooke, & Morrison,

2007; Scheman, Janotta, Bena, & Covington, 2007). Patients' depression, anxiety, and stress scales scores were included in analyses.

2.3.3 Depression, Anxiety, and Stress Scales-21

The Depression, Anxiety, and Stress Scales-21 (DASS-21) is a 21 item short form version of the original DASS-42 and is scored by doubling the sum of scores for each of the three scales: depression, anxiety, and stress (Psychology Foundation of Australia, 2013) (see Appendix C). The 21 items were selected based on good factor loadings, their ability to assess each subscale, and the obtainment of similar scale scores to the 42 items by doubling the scores of the each subscale for DASS-21 (Psychology Foundation of Australia, 2013). The reliable (internal consistency of $\alpha = .91$ depression scale, $\alpha = .80$ anxiety scale, and $\alpha = .84$ stress scale) and valid (convergent validity with Mental Component Summary from $r = -.58$ to $-.69$) short form was implemented in Cleveland Clinic's CPRP in 2012 (Sinclair et al., 2012). The DASS-21 has been shown to produce depression, anxiety, and stress score means that are nearly identical to those of the DASS-42 for clinical (Anthony et al., 1998) and chronic pain patients (Olthoff & Fishman, 2010). Patients from 2012 to 2013 completed this questionnaire.

2.3.4 Numerical Rating Scale-11

The Numerical Rating Scale-11 is an 11-point Likert scale used to measure patient pain, with scores that range from 0, no pain, to 10, worst pain possible (Hawker et al., 2011) (see Appendix D). The scale has demonstrated good test-retest reliability at $r = .95-.96$

and strong construct validity with the Visual Analog Scale in patients with rheumatoid arthritis and other chronic pain conditions at $r = .86$ (Hawker et al., 2011).

2.4 Data Analyses

2.4.1 Repeated Measures Analysis of Variance

Repeated measures analyses of variance (ANOVAS) were conducted with PDI, DASS depression, DASS anxiety, DASS stress, and Numerical Rating Scale scores for admission, discharge, and six months. At the indication of a gender difference for a variable, repeated measures analyses of variance for admission to discharge and discharge to six months were conducted to determine at what time point the gender difference occurred. Six month univariate ANOVAS were also used for PDI Scale scores to determine the presence of gender differences for specific scales upon findings of significant differences for patient's overall scores at six month follow-up. Levene's Test was used to test homogeneity of variances. For all analyses, $p < 0.01$ was established as the cut-off for significance.

2.4.2 Analysis of Covariance

Analyses of covariance (ANCOVAS) were run using participant admission scores as the covariant to determine whether statistical significance could be attributed to variance associated with differences in the men's and women's scores and *not* with variance among admission scores. Controlling for the variance within admission scores ensured that statistical significance was not better attributed to one group coming into the

program with a higher mean score, and therefore, their scores remaining higher than the other group's at the two other points.

2.3.5 Clinically Significant Change

Participants' mean scores were given clinical classifications for anxiety, depression, stress, disability due to pain, and pain at admission, discharge, and follow-up. Clinical classifications for depression are as follows: 0-7=normal, 8-9=mild, 10-14=moderate, 15-19=severe, and ≥ 20 extremely severe (Lovibond & Lovibond, 1995). Clinical classifications for anxiety are 0-9 normal, 10-13 mild, 14-20 moderate, 21-27 severe, and ≥ 28 extremely severe (Lovibond & Lovibond, 1995). For stress, 0 to 14 is normal, 15 to 18 is mild, moderate is 19 to 25, 26-33 is severe, and extremely severe are scores greater than 34 (Lovibond & Lovibond, 1995). Pain classifications are 0 (no pain), 1-4 (mild pain), 5-6 (moderate pain), and 7-10 (severe pain) (Turner, 2004). The common practice of the Neurological Center for Pain of Cleveland Clinic is to rate disability due to pain none to mild for scores between 0 and 10, mild to moderate for scores in the 10 to 30 range, moderate to severe for scores between 30 and 50, and 50 to 70 denotes severe disability. Clinically significant change for each measures is considered a categorical shift for participants' mean scores among extremely severe, severe, moderate, mild, and normal classifications between two time points (admission to discharge or discharge to six month).

CHAPTER III

RESULTS

3.1 Participant Demographic Information

The mean age of participants was 46.2 years. The mean age of men was 46.4 years, and the mean age of women was 45.3 years. The majority of participants, 64.4%, were married. Nineteen percent were single, 1.2% separated, 11% divorced, 3.1% cohabitate, 1.2% were widowed. The majority of men were married (64.3%). Of the remainder, 21.4% were single, 10.7% divorced, and 3.6% cohabitated. No men were separated or widowers. The majority of women were also married (64.4%), with 18.5% single, 1.5% separated, 11.1% divorced, 3.0% cohabitated, and 1.5% were widows. Participants' mean duration of pain was 16.1 years. Men's mean duration of pain was 14.6 years and women's was 16.4 years. Chi-square analyses were used to determine that no significant differences for age, marital status, pain duration, pain, mood, and function were identified between men and women (see Table 3).

3.2 Missing Data for Pain, Mood, and Function

Of 615 total CPRP participants from 2006 to 2013, 509 completed the program (82.8%). The 106 participants who did not complete the program were not included in analyses.

Comparisons were conducted by chi-square analyses to determine whether effect differences were present among program completers versus those who did not complete the program (see Table 4). No differences were present for participants' mood, function, gender, marital status, or age. Analyses revealed that participants who did not complete the program had a shorter duration of pain ($M=14.27$ years, $SD=11.80$) and higher admission pain ($M=7.33$, $SD=1.94$) than participants who did complete the program ($M=14.85$ years, $SD=11.41$; $M=6.85$, $SD=1.83$).

185 of 509 CPRP program completers returned follow-up questionnaires at six months post treatment (36.3%). Chi-square analyses were conducted to determine whether differences in effects were present for participants who returned follow-up questionnaires versus those who did not (see Table 5). Comparisons determined that participants who did not return the follow-up data entered the program with higher anxiety ($M=15.49$, $SD=11.31$) and greater impairments in functioning ($M=43.91$, $SD=13.83$) but shorter duration of pain ($M=13.71$ years, $SD=10.79$) than those who did return follow up ($M=13.79$, $SD=9.50$; $M=42.28$, $SD=12.87$; and $M=15.22$ years, $SD=11.85$ respectfully).

Twenty two of the remaining 185 participants were excluded from analyses (11.89% of 185 follow up) because 50% or more of their data for one or more assessments and/or time points was missing. Participants' failure to complete at least 50% of assessments was considered invalid for determining program efficacy.

To determine the most appropriate method for handling missing data, repeated measures ANOVAS were conducted (see Table 6). Means of the 163 remaining participants (labeled true means) were compared to means of missing data that was

handled either by replacing them with series means (labeled replaced) or by further excluding them from analyses (labeled deleted). Analyses determined that replacing missing data with series mean was the most appropriate for analyses, since means for both men and women were most closely matched or identical to those which included missing data. Replacing missing data did not alter the outcomes of statistical tests for significance.

Participants with less than 50% incomplete or missing data for time points and assessments were still included in analyses, but series means were used to account for missing values. Table 7 shows variables for which means were replaced, the total number of participants whose missing data was replaced, and what percentage their missing data accounted for of the total number of participants included in analyses.

3.3 Missing Data for Pain Disability Index Scales

Comparison of participants mean scores were again conducted using repeated measures ANOVAS to determine the most appropriate way of handling missing data for the seven PDI scales (see Table 8). Analyses determined that replacing missing data with series means remained the most appropriate method for handling missing data, since the means of the participants before handling missing data was either most closely matched or identical to the data using replaced series means for both men and women. Table 9 displays the number of participants who had missing data replaced for five of the seven scales and the percentage they represented of the 163 participants included in analyses (see Table 9).

3.4 Comparison of DASS-42 and DASS-21

Analyses of variance were conducted to ensure that participant's mean depression, anxiety, and stress scale scores did not differ between those that completed the DASS-42 and DASS-21. Although the majority of participants (67%) completed the DASS-42, no statistically significant differences were found between DASS-42 and DASS-21 admission, discharge, or six month-follow up mean scores among the depression, anxiety, and stress scales scores.

3.5 Clinical and Statistical Benefits of IPRP for Fibromyalgia: Admission to Discharge

Patient scores were compared using repeated measures ANOVAS to determine the efficacy of the program (see Tables 10 and 11). Admission to discharge scores for pain, mood, and function were compared to determine whether men and women benefited from CPRP participation. Analyses revealed that both men and women experienced statistically significant improvements from CPRP participation among all measures at $p < .001$ (see Tables 12 and 13).

Patients also experienced notable clinical improvements from CPRP participation (see Table 14). Notable clinical improvements are shifts among clinical ranges from admission to program discharge. Women and men entered the program with moderate levels of depression and anxiety, which returned to normal upon program completion. Participants entered the program with severe levels of stress and experienced normalization of stress at program completion. Severe levels of pain were reported for women and men, which were reduced to mild at discharge. Participants entered the

program with moderate to severe levels of disability but experienced improvement as they shifted to the mild to moderate range at discharge.

3.6 Maintenance of Statistical and Clinical IPRP Improvements for Fibromyalgia:

Discharge to Six Months

Six months following treatment, men and women continued to experience statistical improvements from admission levels among all measures (see Tables 15 and 17).

Although a statistically significant difference was noted in participants' discharge and six month scores (see Table 16), improvements from admission levels continued at the six month follow-up. The continuance of notable clinical improvements were determined by whether men and women retained the normalization (i.e., their clinical levels remained within the normal ranges) of mood, pain, and function or instead if there was a categorical shift in clinical classification from discharge to six months. Clinically, women retained improvements among all measures. Men, however, only retained clinical improvements for anxiety, stress, and pain, since their depression and function levels returned to admission ranges (see Table 14).

3.7 Gender Differences Among Fibromyalgia Patients at Admission and Discharge

The presence of gender differences were explored at three time points of the CPRP: admission, discharge, and six month follow up. Gender differences were not present at admission and discharge for any measure (see Table 19). Analyses indicated that a time by gender interaction was not present, in other words, patient CPRP improvements from admission to discharge are not affected by gender (Table 12). These findings suggest that

an interdisciplinary treatment program does not initially produce differential results for pain, mood, and function for men and women.

3.8 Gender Differences in Function at Six Month Follow-Up

Statistically significant gender differences emerged at six month follow-up. A significant time by gender interaction for function was present for patients from discharge to six month follow-up, meaning that from discharge to six months CPRP benefits in function are affected by gender (see Table 16). At six months following treatment, men reported significantly higher rates of total disability than women ($F=7.37$, $p=.007$). Further analysis of specific areas of impairment for men revealed gender differences for four of the seven domains of the Pain Disability Index at six month follow-up. Men reported significantly higher rates of impairment related to the recreation ($F=11.11$, $p=.001$), social activity ($F=9.09$, $p=.003$), occupation ($F=9.51$, $p=.002$) and sexual behavior (11.75 , $p=.001$) domains of the Pain Disability Index (see Tables 19 and 20). These findings suggest that although men and women do not initially respond differentially to treatment (see Table 12), that is, gender does not affect whether they both improve from admission to discharge, time by gender effects are noted from discharge to six month follow-up since men experience difficulty maintaining IPRP improvements, in terms of pain related functioning (see Table 16).

3.9 Homogeneity of Variance

Levene's test of homogeneity of variance was conducted to test for equality of variance. It determined that the assumption of equality of variance had not been violated for any measure (see Table 21).

3.10 Controlling for Admission Scores

Analyses of Covariance (ANCOVAS) were employed to control for possible differences in scores at admission. Similar to previous findings, men and women demonstrated improvements among all measures even when controlling for admission scores (see Table 22). The improvements following participation in the IPRP remained statistically significant among all measures at $p < .001$ despite controlling for admission scores. Controlling for admission scores among women and men determined that admission scores do not affect the presence of gender differences in function from discharge to six months (see Table 22).

CHAPTER IV

DISCUSSION

The results of this study demonstrate that both men and women experienced normalization of anxiety, stress, and pain at CPRP completion and sustained these treatment gains six months following treatment. Furthermore, findings suggest that men and women with fibromyalgia experience stress, anxiety, and pain equally at admission, discharge, and six months following treatment since time by gender interactions were not present. Men and women experienced normalization of functioning and depression at discharge but men do not sustain clinical improvements at six month follow-up, despite initial CPRP gains. A comparison of statistically significant differences of time by gender interactions among participants' scores for total disability and among the seven domains of the PDI revealed that men experience statistically greater impairment in functioning, specifically in the areas of the recreation, social activity, occupation, and sexual behavior domains of the Pain Disability Index.

Possible factors accounting for gender differences among IPRP participants with fibromyalgia may include differences in the experience of chronic pain and fibromyalgia symptomatology. Research on gender differences in chronic pain has demonstrated that

disability is more closely associated with pain in men than women (Hirsch et al., 2006). Additionally, women with fibromyalgia have been shown to have a lower pain threshold when assessing tender points, thus raising concern of inaccurate diagnosis of fibromyalgia in men (Marcus, 2009). Differences in survey response styles and treatment seeking behaviors between women and men may also influence results. Furthermore, it should be considered whether it is these variables that are ultimately responsible for findings of greater impairment in men or if men with fibromyalgia do *actually* experience greater impairments in functioning.

Findings from previous studies have supported the present study's findings of no gender differences for mood and pain (Aparicio et al., 2012; Gormsen, 2010; Häuser et al., 2011; Hooten et al., 2007; White et al., 1999; Yunus, 2004; Yunus, 2000). Likewise, the presence of gender differences in functioning in this study, specifically men reporting greater impairment than women, has been supported by previous studies (Aparicio et al., 2012; Buskila et al., 2000; Castro-Sánchez et al., 2012).

Several studies did not find gender differences in fibromyalgia (Gormsen et al., 2010; White et al., 1999; Yunus et al., 2000). The different results may relate to the way participants were selected for inclusion. Previous studies used the American College of Rheumatology 1990 criteria for the diagnosis of fibromyalgia, while the present study included participants who were diagnosed using both the 1990 and 2010 criteria.

This study has several limitations that should be considered. First, multiple comparisons could have increased the risk of a Type I error, though a reduced p value of $p < .01$ and repeated measures ANOVAS were used to reduce this risk as much as possible. Secondly, a discrepancy is present in the number of men versus women

included in analyses, although analyses revealed that differences were not present for demographic variables. Another concern is the possibility of non-random selection, since patients who participated in the program had the financial, health care, and motivational means for doing so. Due to this self-selection bias, results of CPRP participants may not be generalizable to all individuals within the community with fibromyalgia. The sample of patients in this study were characterized by moderate levels of anxiety and depression, severe levels of stress and pain, and moderate to severe levels of impairment in function. Although the data reported here are consistent with some studies that involved nonclinical samples (e.g., no differences in pain or mood; White et al., 2000), fibromyalgia symptomology is highly variable and many individuals with fibromyalgia are high functioning without such severe levels of pain and stress. Additionally, participants were diagnosed using either the 1990 and 2010 American College of Rheumatology's criteria for the diagnosis of fibromyalgia, which may have resulted in a sample that is not fully homogeneous. Furthermore, bias may have been introduced into the analyses by including only those participants who completed admission, discharge, and six month follow-up assessments. Comparisons among CPRP completers versus noncompleters and participants returning six month follow-up versus those who did not was conducted to explore these risks. Chi-square analyses found that participants who did not complete the program had a lower duration of pain and higher pain at admission, and participants who did not return follow-up data had higher admission anxiety and impairments in functioning and lower duration of pain. In addition, a larger sample size would have provided more power to analyze the data but was not available due to the retrospective nature of the study. Lastly, medication usage may influence many of the

outcome measures in the study. Opioid usage has been associated with an increased risk of program noncompletion but this study did not account for use at admission (Dersh et al., 2008). Importantly, research suggests that IPRP participants who undergo analgesic medication withdrawal receive significant pain, mood, and functioning improvements and sustain them six months following treatment (Hooten, Townsend, Sletten, Bruce, & Rome, 2007; Kidner, Mayer, & Gatchel, 2009; Rome et al., 2004; Townsend et al., 2008). Additionally, gender differences among pre and post IPRP treatment that incorporated opioid withdrawal have not been reported (Hooten et al., 2007).

These findings may not be generalizable to all interdisciplinary pain approach programs since program components and psychological theoretical orientations vary among IPRPs. Cleveland Clinic's theoretical approach is more psychodynamic in nature than many other programs, though cognitive behavioral therapy components are included as a part of the treatment. Other programs adhere more strictly to a cognitive and/or purely behavioral perspective. Additionally, Cleveland Clinic's CPRP includes the weaning of habituating medication, such as opioids, which is not included in all IPRPs. These differences should be accounted for when drawing conclusions from this study to other IPRPs. Furthermore, including only participants who completed the program and returned follow-up data in analyses resulted in participant differences versus those who did not complete the program or did not return follow-up data. These differences should be taken into account before determining the generalizability of these data to the general population of individuals with fibromyalgia.

Additional research is needed to substantiate the findings reported in this study, since it is the first to include exploration across genders for sustained outcomes of

fibromyalgia patients. Further analyses should be conducted to include longer term (e.g., 12-18 months) outcomes to determine the extent to which improvement persists following IPRP treatment.

The findings of this study are important, since they suggest that both men and women with fibromyalgia do improve from IPRP treatment and that men may struggle more so in the areas of depression and functioning after treatment. Future research should explore interventions that may enhance or improve long-term outcomes in men with fibromyalgia who participate in IPRPs. Tailoring program components to remediate men's difficulty with sustaining IPRP improvements could enhance treatment benefits. In this regard, it would appear to be particularly beneficial to incorporate therapies specifically tailored to address men's impairments in functioning in the realms of recreation, social activity, occupation, and sexual behavior. These findings are important clinically, since they demonstrate that men's concerns in these areas must be addressed during treatment in order for men to be able to sustain improvements regardless of initial treatment outcomes.

Variables that may account for men's differential response post treatment should also be explored, such as the psychological, physical, or cognitive factors that result in men's increased impairment in functioning between discharge and six months follow-up. Additional follow-up treatment may be necessary which incorporates additional therapies that address men's concerns regarding occupation, social activity, recreation, and sexual behavior domains of the Pain Disability Index to increase long term total level of functioning. Participation in outpatient fibromyalgia groups specifically for men may be beneficial to address these concerns in an environment that allows for free exchange of

problems, concerns, and questions regarding these areas. Additionally, men struggle to maintain treatment gains due to the stigmatizing nature of the view of fibromyalgia as a predominantly female oriented diagnosis. They may also challenge to accept the diagnosis since fibromyalgia is a poorly understood medical disorder that for some individuals is still conceptualized to be a somatoform disorder. Interventions that focus on acceptance and understanding of the disorder may lead to enhanced treatment sustainability.

Importantly, future research should also investigate the impact of men's inability to sustain treatment gains for men on their overall level of functioning with fibromyalgia. Long term outcomes may show men's inability to sustain IPRP treatment gains profoundly affects them in all areas of their lives. In addition to improving the lives of affected individuals, increased understanding of long term outcomes and appropriate interventions for improving treatment sustainability will improve the stark societal costs of fibromyalgia.

REFERENCES

- Ablin, J., Fitzcharles, M. A., Buskila, D., Shir, Y., Sommer, C., & Häuser, W. (2013). Treatment of fibromyalgia syndrome: Recommendations of recent evidence-based interdisciplinary guidelines with special emphasis on complementary and alternative therapies. *Evidence-Based Complementary and Alternative Therapies*, 2013, 1-7.
- Anderson, F. J. & Winkler, A. E. (2006). Benefits of long-term fibromyalgia syndrome treatment with a multidisciplinary program. *Journal of Musculoskeletal Pain*, 14(4), 11-25.
- Angst, F., Brioschi, R., Main, C. J., Lehmann, S., & Aeschlimann, A. (2006). Interdisciplinary rehabilitation in fibromyalgia and chronic back pain: a prospective outcome study. *The Journal of Pain*, 7(11), 807-815.
- Anthony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-Item and 21-Item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*, 10(2), 176-181.
- Aparicio, W. A., Ortega, F. B., Carbonell-Baeza, Femia, P., Tercedor, P., Ruiz, J. R., & Delgado-Fernández, M. (2012). Are there gender differences in quality of life and symptomology between fibromyalgia patients? *American Journal of Men's Health*, 6(4), 314-319.
- Bellato, E., Marini, E., Castoldi, F., Barbasetti, N., Lorenzo, M., Bonasia, D. E., & Blonna, D. (2012). Fibromyalgia syndrome: Etiology, pathogenesis, diagnosis, and treatment. *Pain Research and Treatment*, 2012, 1-17.

- Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. A., (1996). Psychometric properties of the Depression Anxiety and Stress Scales (DASS) in clinical samples. *Behavior Research and Therapy*, 35(1), 79-89.
- Buskila, D., Neumann, L., Alhoashle, A., & Abu-Shakra, M. (2000). Fibromyalgia syndrome in men. *Seminary in Arthritis and Rheumatism*, 30(1), 47-51.
- Carbonell-Baeza, A., Aparicio, V. A., Chillón, P., Femia, P., Delgado- Fernández, M., & Ruiz, J. R. (2011). Effectiveness of multidisciplinary therapy on symptomatology and quality of life in women with fibromyalgia. *Clinical and Experimental Rheumatology*, 29(Suppl. 69), S97-S103.
- Carville, S. F., Arendt-Nielson, S., Bliddal, H., Blotman, F., Branco, J. C., Buskila, D., ... Choy, E. H. (2008). EULAR evidence-based recommendations for the management of fibromyalgia syndrome. *Annals of Rheumatic Disease*, 67(4), 536-541.
- Castro-Sánchez, A. M., Matarán-Peñarrocha, G. A., López-Rodríguez, M. M., Lara-Paloma, I. C., Arendt-Nielsen, L. A., & Fenández-de-las-Peñas, C. (2012). Gender differences in pain severity, disability, depression, and widespread pressure pain sensitivity in patients with fibromyalgia syndrome without comorbid conditions. *Pain Medicine*, 13(12), 1639-1647.
- Chandran, A., Schaefer, C., Ryan, K., Baik, R., McNett, M., & Zlateva, G. (2012). The comparative economic burden of mild, moderate, and severe fibromyalgia: Results from a retrospective chart review and cross-sectional survey of working-age U. S. adults. *Journal of Managed Care Pharmacy*, 16(6), 415-426.

- Crawford, J. R. & Henry, J. D. (2007). The Depression Anxiety Stress Scale (DASS): Normative data and latent structure in a large non-clinical sample. *British Journal of Clinical Psychology*, 42(2), 111-131.
- Crofford, L. J. (2013). *Fibromyalgia*. Retrieved from American College of Rheumatology website: http://www.rheumatology.org/Practice/Clinical/Patients/Diseases_And_Conditions/Fibromyalgia/
- Dersh, J., Mayer, T. G., Gatchel, R. J., Polatin, P. B., Theodore, B. R., & Mayer, E. A. (2008). Prescription opioid dependence is associated with poorer outcomes in disabling spinal disorders. *Spine*, 33(20), 2219-2227.
- Gormsen, L., Rosenberg, R., Bach, F. W., & Jensen, T. S. (2010). Depression, anxiety, health-related quality of life and pain in patients with chronic fibromyalgia and neuropathic pain. *European Journal of Pain*, 14(2), 127.e1-127.e8.
- Häuser, W., Kuhn-Becker, H., von Wilmoswky, H., Settan, M., Brahler, El, & Petzke, F. (2011). Demographic and clinical features of patients with fibromyalgia syndrome of different settings: A gender comparison. *Gender Medicine*, 8(2), 116-125.
- Häuser, W., Thieme, K., & Turk, D. C. (2010). Guidelines on the management of fibromyalgia syndrome—a systematic review. *European Journal of Pain*, 14(1), 5-10.
- Hawker, G. A., Mian, S., Kendzerska, T., & French, M. (2011). Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numerical Rating Scale for Pain (NRS for Pain), McGill Pain Questionnaire (MPQ), Short Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36

- Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care and Research*, 63(S11), S240-S252.
- Hirsh, A. T., Waxenberg, L. B., Atchison, J. W., Gremillion, H. A., & Robinson, M. E. (2006). Evidence for sex differences in the relationship of pain, mood, and disability. *The Journal of Pain*, 7(8), 592-601.
- Hooten, W. M., Townsend, C. O., & Decker, P. A. (2007). Gender differences among patients with fibromyalgia undergoing multidisciplinary pain rehabilitation. *American Academy of Pain Medicine*, 8(8), 624-632.
- Hooten, W. M., Townsend, C. O., Sletten, C. D., Bruce, B. K., & Rome, J. D. (2007). Treatment outcomes after multidisciplinary pain rehabilitation after analgesic medication withdrawal for patients with fibromyalgia. *Pain Medicine*, 8(1), 8-16.
- Keogh, E. & Herdenfeldt, M. (2002). Gender, coping and the perception of pain. *Pain*, 97(2002), 195-201.
- Kidner, C. L., Mayer, T. G., & Gatchel, R. L. (2009). Higher opioid doses predict poorer functional outcome in patients with chronic disabling occupational musculoskeletal disorders. *The Journal of Bone and Joint Surgery*, 91(4), 919-927.
- Lawrence, R. C., Felson, D. T., Helmick, C. G., Arnold, L. M., Choi, H., Deyo, R. A., ... Wolfe, F. (2008). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. *Arthritis & Rheumatism*, 58(1), 26-35.
- Lemstra, M. & Olszynski, W. P. (2005). The effectiveness of multidisciplinary rehabilitation in the treatment of fibromyalgia. *The Clinical Journal of Pain*, 21(2), 166-174.

- LeResche, L. (2011). Defining gender disparities in pain management. *Clinical Orthopaedics and Related Research*, 2011(469), 1871-1877.
- Lovibond, S. H. & Lovibond, P. F. (1995). Manual for the Depression Anxiety Stress Scales. (2nd Ed) Sydney: Psychology Foundation.
- Marcus, D. A. (2009). Fibromyalgia: Diagnosis and treatment options. *Gender Medicine*, 6 (Suppl 2), 139-151.
- Martín, J., Torre, F., Padierna, A., Aguirre, U., González, N., García, S., ... Quintana, J. M. (2012). Six-and-12 month follow-up of an interdisciplinary fibromyalgia treatment programme: Results of a randomised trial. *Clinical and Experimental Rheumatology*, 30(Suppl 74), S103, S111.
- Mas, A. J., Carmona, L., Valverde, M., Ribas, B., & the EPISER Study Group (2008). Prevalence and impact of fibromyalgia on function and quality of life in individuals from the general population: Results from a nationwide study in Spain. *Clinical and Experimental Rheumatology*, 26(4), 519-526.
- Meeus, M. & Nijs, J. (2007). Central sensitization: A biopsychosocial explanation for chronic widespread pain in patients with fibromyalgia and chronic fatigue syndrome. *Clinical Rheumatology*, 26(4), 465-473.
- Munce, S E. P. & Stewart, D. E. (2007). Gender differences in depression and chronic pain conditions in a national epidemiologic survey. *Psychosomatics*, 48(5), 394-399.
- Olivieri, P., Solitar, B., & Dubois, M. (2012). Childhood risk factors for developing fibromyalgia. *Open Access Rheumatology: Research and Reviews*, 2(4), 209-114.

- Olthoff, J. & Fishman, D. (2010). [Split-half reliability of Depression, Anxiety, and Stress Scales-42: 21 items included in DASS-21 versus those excluded].
Unpublished raw data.
- Page, A. C., Hooke, G. R., & Morrison, D. L. (2007). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in depressed clinical samples. *British Journal of Clinical Psychology*, 46(3), 283-297.
- Paller, C. J., Campbell, C. M., Edwards, R. R., & Dobs, A. S. (2009). Sex differences in pain perception and treatment. *Pain Medicine*, 10(2), 289-299.
- Psychology Foundation of Australia. (2013). Depression Anxiety Stress Scale – DASS.
Retrieved from <http://www2.psy.unsw.edu.au/groups/dass//>
- Sinclair, S. J., Siefert, C. J., Slavin-Mulford, J. M., Stein, M. B., Renna, M., & Blais, M. A. (2013). Psychometric evaluation and normative data for the Depression, Anxiety, and Stress Scales-21 (DASS-21) in a nonclinical sample of U. S. adults. *Evaluation & The Health Professions*, 35(3), 259-279.
- Rome, J. D., Townsend, C. O., Bruce, B. K., Sletten, C. D., Luedtke, C. A., & Hodgson, J. E. (2004). Chronic noncancer pain rehabilitation with opioid withdrawal: Comparison of treatment outcomes based on opioid use status at admission. *Mayo Clinic Proceedings*, 79(6), 759-768.
- Scheman, J., Janotta, C., Bena, J., & Covington, E. (2007). Validity study of the Depression Anxiety Stress Scales in a sample of chronic pain patients [Abstract]. *American Pain Society Abstracts*, 8(4), S69.
- Tait, R. C., Chibnall, J. T., & Krause, S. (1990). The Pain Disability Index: Psychometric properties. *Pain*, 40(2), 171-182.

- Townsend, C. O., Bruce, B. K., Hooten, W. M., & Rome, J. D. (2006). The role of mental health professionals in multidisciplinary pain rehabilitation programs. *Journal of Clinical Psychology*, 62(11), 1433-1443.
- Townsend, C. O., Kerkvliet, J. L., Bruce, B. K., Rome, J. D., Hooten, W. M., Luedtke, C. A., & Hodgson, J. E. (2008). A longitudinal study of the efficacy of a comprehensive pain rehabilitation program with opioid withdrawal: Comparison of treatment outcomes based on opioid use status at admission. *Pain*, 140(1), 177-189.
- Turk, D. C., Okifji, A., Sinclair, J. D., & Startz, T. W. (1998). Interdisciplinary treatment for fibromyalgia syndrome: Clinical and statistical significance. *Arthritis Care and Research*, 11(3), 186-195.
- Turner, J. A., Franklin, G., Heagerty, P. J., Wu, R., Egan, K., Fulton-Kehoe, D., ... Wickizer, T. M. (2004). The association between pain and disability. *Pain*, 112(3), 307-314.
- Vincent, A., Lahr, B., Wolfe, F., Clauw, D. J., Whipple, M. O., Oh, T. H., ... St. Sauver, J. (2013). Prevalence of fibromyalgia: A population-based study in Olmsted County, Minnesota, utilizing the Rochester Epidemiology Project. *Arthritis Care & Research*, 65(5), 786-792.
- White, K. P., Speechley, M., Harth, M., & Østbye, T. (1999). The London Fibromyalgia Epidemiology Study: Comparing the demographic and clinical characteristics in 100 random community cases of fibromyalgia versus controls. *The Journal of Rheumatology*, 26(7), 1577-1585.

- Wolfe, F. (2010). New American College of Rheumatology criteria for fibromyalgia: A twenty-year journey. *Arthritis Care and Research*, 62(5), 583-584.
- Wolfe, F., Brähler, E., Hinz, A., & Häuser, W. (2013). Fibromyalgia prevalence, somatic symptom reporting, and the dimensionality of polysymptomatic distress: Results from a survey of the general population. *Arthritis Care & Research*, 65(5), 777-785.
- Wolfe, F., Clauw, D. J., Fitzcharles, M., Goldenberg, D. L., Katz, R. S., Mease, P., ... Yunus, M. B. (2010). The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. *Arthritis Care and Research*, 62(5), 600-610.
- Wolfe, F., Ross, K., Anderson, J., Russell, I. J., & Hebert, L. (1995). The prevalence and characteristics of fibromyalgia in the general population. *Arthritis and Rheumatism*, 38(1), 19-28
- Wolfe, F., Smythe, H. A., Yunus, M. B., Bennett, R. M., Bombarier, C., Goldenberg, D. L., ... Sheon, R. P. (1990). The American College of Rheumatology 1990 criteria for the classification of fibromyalgia: Report of the Multicenter Criteria Committee. *Arthritis and Rheumatism*, 33(2), 160-172.
- Yunus, M. B., Celiker, R., & Aldag, J. C. (2004). Fibromyalgia in men: Comparison of psychological features with women. *The Journal of Rheumatology*, 31(12), 2464-2467.
- Yunus, M. B., Inanici, F., Aldag, J. C., & Mangold, R. F. (2000). Fibromyalgia in men: Comparison of clinical features with women. *The Journal of Rheumatology*, 27(2), 485-490.

Table 1. The 1990 American College of Rheumatology Criteria for the Classification of Fibromyalgia

1. History of widespread pain

Definition. Pain is considered widespread when all of the following are present: pain in the left side of the body, pain in the right side of the body, pain above the waist, and pain below the waist. In addition, axial skeletal pain (cervical spine or anterior chest or thoracic spine or low back) must be present. In this definition, shoulder and buttock pain is considered as pain for each involved side. “Low back” pain is considered segment pain.

2. Pain in 11 of 18 tender point sites on digital palpation.

Definition. Pain, on digital palpation, must be present in at least 11 of the following 18 tender point sites:

Occiput: bilateral, at the suboccipital muscle insertions.

Low cervical: bilateral, at the anterior aspects of the intertransverse spaces at C5-C7.

Trapezius: bilateral, at the midpoint of the upper border.

Supraspinatus: bilateral, at origins, above the scapula spine near the medial border.

Second rib: bilateral, at the second costochondral junctions, just lateral to the junctions on upper surfaces.

Lateral epicondyle: bilateral, 2 cm distal to the epicondyles.

Gluteal: bilateral, in upper outer quadrants of buttocks in anterior fold of muscle.

Greater trochanter: bilateral, posterior to the trochanteric prominence.

Knee: bilateral, at the medial fat pad proximal to the joint line.

Digital palpation should be performed with an approximate force of 4 kg.

For a tender point to be considered “positive” the subject must state that the palpations was painful. “Tender” is not to be considered “painful.”

For classification purposes, patients will be said to have fibromyalgia if both criteria are satisfied. Widespread pain must have been present for at least 3 months. The presence of a second clinical disorder does not exclude the diagnosis of fibromyalgia.

Table 2. The American College of Rheumatology 2010 Preliminary Diagnostic Criteria for Fibromyalgia

Criteria

A patient satisfies diagnostic criteria for fibromyalgia if the following 3 conditions are met:

- 1) Widespread pain index (WPI) ≥ 7 and Symptom Severity (SS) score ≥ 5 or WPI between 3 and 6 and SS ≥ 9
- 2) Symptoms have been present at a similar level for at least 3 months
- 3) The patient does not have a disorder that would otherwise explain the pain

Ascertainment

- 1) WPI: note the number of areas in which the patient has had pain over the last week.

In how many areas has the patient had pain? Score will be between 0 and 19:

Shoulder girdle, left	Hip (buttock, trochanter), left	Jaw, left	Upper back
Shoulder girdle, right	Hip (buttock, trochanter), right	Jaw, right	Lower back
Upper arm, left	Upper leg, left	Chest	Neck
Upper arm, right	Upper leg, right	Abdomen	
Lower arm, left	Lower leg, left		
Lower arm, right	Lower leg, right		

- 2) SS Scale Score:

Fatigue

Waking unrefreshed

Cognitive symptoms

For each of the 3 symptoms above, indicate the level of severity over the last week using the following scale:

0 = no problem

1 = slight or mild problems, generally mild or intermittent

2 = moderate, considerable problems, often present and/or at a moderate level

3 = severe: pervasive, continuous, life-disturbing problems

Considering somatic symptoms* in general, indicate whether the patient has:

0 = no symptoms

1 = few symptoms

2 = a moderate number of symptoms

3 = a great deal of symptoms

The SS scale score is the sum of the severity of the 3 symptoms (fatigue, waking unrefreshed, cognitive symptoms) plus the extent (severity) of somatic symptoms in general. The final score is between 0 and 12.

*Somatic symptoms that might be considered: muscle pain, irritable bowel syndrome, fatigue/tiredness, thinking or remembering problem, muscle weakness, headache, pain/cramps in the abdomen, numbness/tingling, dizziness, insomnia, depression, constipation, pain in the upper abdomen, nausea, nervousness, chest pain, blurred vision,

fever, diarrhea, dry mouth, itching, wheezing, Raynaud's phenomenon, hives/welts, ringing in ears, vomiting, heartburn, oral ulcers, loss of/change in taste, seizures, dry eyes, shortness of breath, loss of appetite, rash, sun sensitivity, hearing difficulties, easy bruising, hair loss, frequent urination, painful urination, and bladder spasms.

Table 3. Pearson Chi-Square Analysis for Women and Men

	Value	Df	Asymp Sig. (2-sided)
Age	48.246	51	.584
Marital Status	.964	5	.965
Pain Duration	47.720	43	.287
Admission Pain	12.681	12	.393
Discharge Pain	7.074	14	.932
Six Months Pain	7.003	15	.958
Admission Depression	38.509	33	.234
Discharge Depression	33.996	26	.135
Six Months Depression	47.171	36	.101
Admission Anxiety	31.570	36	.679
Discharge Anxiety	18.896	22	.652
Six Months Anxiety	25.236	26	.506
Admission Stress	45.140	35	.117
Discharge Stress	28.455	28	.441
Six Months Stress	36.811	31	.218
Admission Function	48.642	48	.447
Discharge Function	41.170	40	.419

Table 4. Pearson Chi-Square Analysis for Program Completion

	Value	Df	Asymp Sig. (2-sided)
Age	60.851	66	.656
Marital Status	4.212	5	.519
Gender	.117	1	.732
Pain Duration	87.001	61	.016
Admission Pain	28.091	15	.021
Admission Depression	55.497	45	.136
Admission Anxiety	50.081	45	.279
Admission Stress	56.498	45	.117
Admission Function	18.084	14	.203

Table 5. Pearson Chi-Square Analysis for Follow-Up

	Value	Df	Asymp Sig. (2-sided)
Age	83.468	64	.052
Marital Status	6.949	6	.326
Gender	1.236	3	.740
Pain Duration	70.300	52	.046
Admission Pain	24.681	19	.171
Discharge Pain	26.000	17	.074
Admission Depression	44.297	45	.502
Discharge Depression	41.135	42	.509
Admission Anxiety	65.416	43	.015
Discharge Anxiety	29.938	36	.751
Admission Stress	51.212	43	.212
Discharge Stress	42.553	38	.281
Admission Function	106.852	61	.000
Discharge Function	50.736	51	.484

Table 6. Comparison of Means for Pain, Mood, and Function Admission, Discharge, and Six Month Follow-Up Scores

		True Means			Replaced W=135 M=28		Deleted W=114 M=22	
		N	Mean	SD	Mean	SD	Mean	SD
Depression	Women	135	17.99	12.30	17.99	12.30	18.40	14.41
Admission	Men	28	20.54	12.35	20.54	12.35	22.09	12.03
Anxiety	Women	135	13.50	9.89	13.50	9.89	14.02	9.99
Admission	Men	28	12.54	8.27	12.54	8.27	12.64	8.27
Stress	Women	133	18.30	11.27	18.30	11.27	18.46	11.23
Admission	Men	27	19.44	9.79	19.44	9.79	20.45	9.85
Pain	Women	132	6.53	1.91	6.54	1.89	6.60	1.89
Admission	Men	28	7.07	1.70	7.07	1.70	7.18	1.62
Function	Women	135	43.03	10.97	43.03	43.03	43.29	10.44
Admission	Men	28	42.54	11.34	42.54	42.54	42.36	12.47
Depression	Women	135	5.42	8.19	5.42	5.42	5.32	8.26
Discharge	Men	28	7.54	9.19	7.54	7.54	8.95	9.80
Anxiety	Women	135	5.89	6.70	5.89	5.89	5.85	6.21
Discharge	Men	28	5.93	5.56	5.93	5.93	6.36	6.00
Stress	Women	133	8.36	8.29	8.36	8.23	8.04	8.13
Discharge	Men	27	8.24	6.43	8.24	6.31	9.39	6.36
Pain	Women	134	3.10	2.28	3.10	2.27	2.96	2.29
Discharge	Men	28	3.00	1.91	3.00	1.91	3.09	1.66
Function	Women	134	15.93	11.09	15.93	11.05	15.44	11.06
Discharge	Men	28	18.45	9.45	18.45	9.45	18.39	8.16
Depression	Women	134	10.70	10.96	10.70	10.92	10.84	11.39
Six Months	Men	28	15.64	13.02	15.64	13.02	17.32	13.29
Anxiety Six	Women	134	6.61	7.50	6.52	7.46	6.76	7.43
Months	Men	28	8.96	8.51	8.96	8.51	10.32	8.64
Stress Six	Women	125	11.40	10.53	11.45	10.13	11.49	10.62
Months	Men	24	16.08	10.00	15.52	9.34	17.68	10.36
Pain Six	Women	132	4.36	2.26	4.37	2.24	4.18	2.28
Months	Men	28	4.86	2.16	4.86	2.16	5.00	2.29
Function	Women	135	22.71	15.02	22.71	15.02	22.01	15.60
Six Months	Men	28	33.43	16.09	33.43	16.09	33.59	15.31

Table 7. Replaced Means for Pain, Mood, and Function

	Valid Data		Missing Data	
	N	Percent	N	Percent
Duration Pain	162	99.4%	1	0.6%
Depression 6 Months	162	99.4%	1	0.6%
Anxiety 6 Months	162	99.4%	1	0.6%
Stress Admission	160	98.2%	3	1.8%
Stress Discharge	160	98.2%	3	1.8%
Stress 6 Months	149	91.4%	14	8.6%
Pain Admission	160	98.2%	3	1.8%
Pain 6 Months	160	98.2%	3	1.8%
Function Discharge	162	99.4%	1	0.6%

Table 8. Comparison of Means for Seven Scales of Pain Disability Index at Six Month Follow-Up

		True Means			Replaced W=135 M=28		Deleted W=114 M=22	
		N	Mean	SD	Mean	SD	Mean	SD
Family/ Home	Women	135	3.74	2.36	3.74	2.36	3.56	2.44
	Men	27	4.56	2.65	4.53	2.60	4.68	2.61
Recreation	Women	135	3.99	2.68	3.99	2.68	3.79	2.72
	Men	28	5.82	2.51	5.82	2.51	5.77	2,25
Social	Women	135	3.37	2.53	3.37	2.53	3.22	2.61
	Men	28	5.00	2.94	5.00	2.94	5.00	2.91
Occupation	Women	132	4.44	2.98	4.45	2.94	4.29	3.11
	Men	27	6.37	2.80	6.31	2.77	6.36	2.80
Sexual Behavior	Women	129	3.66	3.37	3.67	3.30	3.58	3.41
	Men	28	6.04	3.43	6.04	3.43	5.91	3.32
Self-Care	Women	134	2.07	2.35	2.07	2.34	2.00	2.34
	Men	28	3.07	2.37	3.07	2.73	3.04	2.84
Life Support Activities	Women	134	1.81	2.44	1.81	2.43	1.76	2.40
	Men	28	2.86	2.88	2.86	2.88	2.82	2.89

Table 9. Replaced Means for the Pain Disability Index Scales

	Valid Data		Missing Data	
	N	Percent	N	Percent
PDI-Family/Home 6 Months	162	99.4%	1	0.6%
PDI-Occupation 6 Months	159	97.5%	4	2.5%
PDI-Sexual 6 Months	157	96.3%	6	3.7%
PDI-Self-Care 6 Months	162	99.4%	1	0.6%
PDI-Life Support 6 Months	162	99.4%	1	0.6%

Table 10. Mean and Standard Deviations for Women and Men for All Measures

		N	Mean	SD
Depression Admission	Women	135	17.99	12.30
	Men	28	20.54	12.35
Depression Discharge	Women	135	5.42	8.19
	Men	28	7.54	9.19
Depression 6 Months	Women	135	10.70	10.92
	Men	28	15.64	13.02
Anxiety Admission	Women	135	13.50	9.89
	Men	28	12.54	8.27
Anxiety Discharge	Women	135	5.89	6.70
	Men	28	5.93	5.56
Anxiety 6 Months	Women	135	6.62	7.47
	Men	28	8.96	8.51
Stress Admission	Women	135	18.31	11.18
	Men	28	19.41	9.61
Stress Discharge	Women	135	8.36	8.23
	Men	28	8.24	6.31
Stress 6 Months	Women	135	11.45	10.13
	Men	28	15.52	9.34
Pain Admission	Women	135	6.54	1.89
	Men	28	7.07	1.70
Pain Discharge	Women	135	3.10	2.27
	Men	28	3.00	1.91
Pain 6 Months	Women	135	4.37	2.34
	Men	28	4.86	4.86
Function Admission	Women	135	43.03	10.97
	Men	28	42.54	11.34
Function Discharge	Women	135	15.93	11.05
	Men	28	18.45	9.45
Function 6 Months	Women	135	22.71	15.02
	Men	28	33.43	16.09
PDI-Family/Home 6 Months	Women	135	3.74	2.36
	Men	28	4.53	2.60
PDI-Recreation 6 Months	Women	135	3.99	2.68
	Men	28	5.82	2.51
PDI-Social Activity 6 Months	Women	135	3.37	2.53

PDI-Occupation 6 Months	Men	28	5.00	2.94
	Women	135	4.45	2.94
PDI-Sexual Activity 6 Months	Men	28	6.31	2.77
	Women	135	3.67	3.30
PDI-Self-Care 6 Months	Men	28	6.04	3.43
	Women	135	2.07	2.34
PDI-Life Support 6 Months	Men	28	3.01	2.73
	Women	135	1.81	2.43
	Men	28	2.86	2.88

Note Means displayed are actual means not adjusted means for covariates

Table 11. Repeated Measures Analysis of Variance Quadratic Contrasts
Results: Admission, Discharge, and Six Months

	Type III SS	df	Mean Square	F	Sig.
Depression					
Time	1720.543	2	1720.543	24.468	.000
Gender	711.717	1	711.7171	3.418	.066
Time * Gender	66.545	1	66.545	.946	.332
Error (Time)	11321.286	160	70.319		
Anxiety					
Time	1268.681	2	1268.681	34.806	.000
Gender	15.609	1	15.609	.124	.725
Time * Gender	127.600	1	127.600	3.501	.063
Error (Time)	5869.029	160	36.447		
Stress					
Time	1338.578	2	1338.578	28.036	.000
Gender	197.651	1	197.651	2.137	.292
Time * Gender	102.032	1	102.032	2.137	.146
Error (Time)	7686.952	160	47.745		
Pain					
Time	222.944	2	222.944	79.314	.000
Gender	6.578	1	6.578	.931	.336
Time * Gender	.022	1	.022	.008	.929
Error (Time)	452.556	160	2.811		
Function					
Time	10039.837	2	10039.837	84.094	.000
Gender	1255.643	1	1255.643	5.011	.027
Time * Gender	1457.444	1	1457.444	12.208	.001
Error (Time)	19221.491	160	119.388		

Table 12. Repeated Measures Analysis of Variance Linear Contrasts Results:
Admission to Discharge

	Type III SS	df	Mean Square	F	Sig.
Depression					
Time	7581.380	1	7581.380	97.989	.000
Gender	251.429	1	251.429	1.745	.188
Time * Gender	2.140	1	2.140	.028	.868
Error (Time)	12456.541	161	77.370		
Anxiety					
Time	2345.271	1	2345.271	59.364	.000
Gender	9.992	1	9.992	.104	.747
Time * Gender	11.774	1	11.774	.298	.586
Error (Time)	6360.574	161	39.507		
Stress					
Time	5168.640	1	5168.640	92.953	.000
Gender	11.294	1	11.294	.089	.766
Time * Gender	17.245	1	17.245	.310	.578
Error (Time)	8952.346	161	55.605		
Pain					
Time	652.792	1	652.792	196.815	.000
Gender	2.153	1	2.153	.426	.515
Time * Gender	4.743	1	4.743	1.430	.234
Error (Time)	534.001	161	3.317		
Function					
Time	30375.519	1	30375.519	294.862	.000
Gender	47.495	1	47.495	.351	.554
Time * Gender	104.656	1	104.656	1.016	.315
Error (Time)	16585.575	161	103.016		

Table 13. Statistically Significant Participant Improvement: Admission and Discharge Scores for Pain, Mood, and Function for Women and Men with Fibromyalgia

Measure	Admission				Discharge			
	Women (N=135)		Men (N=28)		Women (N=135)		Men (N=28)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Depression	17.99	12.3	20.54	12.3	5.42	8.2	7.54	9.2
Anxiety	13.50	9.9	12.54	8.3	5.89	6.7	5.93	5.6
Stress	18.31	1.2	19.41	9.6	8.36	8.2	8.24	6.3
Pain	6.54	1.9	7.07	1.7	3.10	2.3	3.00	1.9
Function	42.54	11.0	43.03	11.3	15.93	11.1	18.45	9.5

Table 14. Participants' Clinical Classifications for Anxiety, Depression, Stress, Pain, and Function at Admission, Discharge, and Six Months Using Assessment Scores

	Admission		Discharge		Six Months	
	Women	Men	Women	Men	Women	Men
Anxiety	13.50 Moderate	12.54 Moderate	5.89 Normal	5.93 Normal	6.62 Normal	8.96 Mild
Depression	17.99 Moderate	20.54 Moderate	5.42 Normal	7.54 Normal	10.70 Mild	15.64 Moderate
Stress	18.31 Severe	19.41 Severe	8.36 Normal	8.24 Normal	11.45 Normal	15.52 Mild
Pain	6.54 Severe	7.07 Severe	3.10 Mild	3.00 Mild	4.40 Moderate	4.86 Moderate
Function	43.03 Moderate -Severe	42.54 Moderate -Severe	15.93 Mild- Moderate	18.45 Mild- Moderate	22.71 Mild- Moderate	33.43 Moderate -Severe

Key for clinical classifications: Anxiety: 0-7=normal, 8-9=mild, 10-14=moderate, 15-19=severe, ≥ 20 =severe. Depression: 0-9=normal, 10-13=mild, 14-20=moderate, 21-27=severe, ≥ 28 =extremely severe. Stress: 0-14 normal, 15-18 mild, 19-25 moderate, 26-33 severe, and 37+ extremely severe. Pain: 0=no pain, 1-3=mild pain, 4-6=moderate pain, 7-10= severe pain. Disability due to pain rating: 0-10=none-mild, 10-30= mild-moderate, 30-50=moderate to severe, 50-70=severe. Notable clinical change is considered a categorical shift from severe/moderate/mild/normal.

Table 15. Repeated Measures Analysis of Variance Linear Contrasts Results:
Admission to Six Months

	Type III SS	df	Mean Square	F	Sig.
Depression					
Time	1720.543	1	1720.543	24.468	.000
Gender	649.077	1	649.077	3.111	.080
Time * Gender	66.545	1	66.545	.946	.332
Error (Time)	11321.286	161	70.319		
Anxiety					
Time	1268.681	1	1268.861	34.809	.000
Gender	22.125	1	22.125	.192	.662
Time * Gender	127.600	1	127.600	3.501	.063
Error (Time)	5868.029	161	36.447		
Stress					
Time	1338.578	1	1338.578	28.036	.000
Gender	310.270	1	310.270	1.806	.181
Time * Gender	102.032	1	102.032	2.137	.146
Error (Time)	7686.952	161	47.745		
Pain					
Time	222.944	1	222.944	79.314	.000
Gender	12.226	1	12.226	2.184	.141
Time * Gender	.022	1	.022	.008	.929
Error (Time)	452.556	161	2.81		
Function					
Time	10039.837	1	10039.837	84.094	.000
Gender	1213.686	1	1213.686	5.199	.024
Time * Gender	1457.444	1	1457.444	12.208	.001
Error (Time)	19221.491	161	119.388		

Table 16. Repeated Measures Analysis of Variance Linear Contrasts Results:
Discharge to Six Months

	Type III SS	df	Mean Square	F	Sig.
Depression					
Time	2078.602	1	2078.602	32.752	.000
Gender	576.674	1	576.674	4.299	.040
Time * Gender	92.544	1	92.544	1.458	.229
Error (Time)	10217.964	161	63.466		
Anxiety					
Time	164.082	1	164.082	6.108	.000
Gender	66.178	1	66.178	.891	.347
Time * Gender	61.854	1	61.854	2.303	.131
Error (Time)	4325.010	161	28.863		
Stress					
Time	1246.561	1	1246.561	22.683	.000
Gender	181.220	1	181.220	1.677	.197
Time * Gender	203.170	1	203.170	3.697	.056
Error (Time)	8847.869	161	54.956		
Pain					
Time	112.752	1	112.752	34.636	.000
Gender	1.739	1	1.739	.263	.609
Time * Gender	4.118	1	4.118	1.265	.161
Error (Time)	524.116	161	3.255		
Function					
Time	5488.847	1	5488.847	51.812	.000
Gender	2031.138	1	2031.138	8.399	.004
Time * Gender	780.998	1	780.998	7.371	.007
Error (Time)	17055.979	161	105.938		

Table 17. Statistically Significant Sustainability of Improvements: Six Month Follow-Up Scores for Pain, Mood, and Function for Women and Men with Fibromyalgia

Measure	Admission				Six Month Follow Up			
	Women (N=135)		Men (N=28)		Women (N=135)		Men (N=28)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Depression	17.99	12.3	20.54	12.3	10.70	11.0	15.64	13.0
Anxiety	13.50	9.9	12.54	8.3	6.61	7.5	8.96	8.5
Stress	18.31	1.2	19.41	9.6	11.45	10.1	15.52	9.3
Pain	6.54	1.9	7.07	1.7	4.4	2.2	4.86	2.2
Function	43.03	11.0	42.54	11.3	22.71	15.0	33.43	16.1

Table 18. Gender Differences at Admission and Discharge

Measure	Admission				Discharge			
	Women (N=135)		Men (N=28)		Women (N=135)		Men (N=28)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Depression	17.99	12.3	20.54	12.3	10.70	11.0	15.64	13.0
Anxiety	13.50	9.9	12.54	8.3	6.61	7.5	8.96	8.5
Stress	18.31	1.2	19.41	9.6	11.45	10.1	15.52	9.3
Pain	6.54	1.9	7.07	1.7	4.4	2.2	4.86	2.2
Function	43.03	11.0	42.54	11.3	22.71	15.0	33.43	16.1

Table 19. Results for Univariate Analysis of Variance for Pain Disability Index Domains: Tests of Between Subject Effects at Six Months

	Type III SS	df	Mean Square	F	Sig.
PDI Family/Home					
Intercept	1586.829	1	1586.829	274.846	.000
Gender	14.494	1	14.494	2.510	.115
Error	929.537	161	5.774		
PDI Recreation					
Intercept	2230.192	1	2230.192	316.750	.000
Gender	78.192	1	78.192	11.106	.001
Error	1133.578	161	7.041		
PDI Social Activity					
Intercept	1624.776	1	1624.776	239.774	.000
Gender	61.586	1	61.586	9.088	.003
Error	1090.981	161	6.776		
PDI Occupation					
Intercept	2684.803	1	2684.803	316.066	.000
Gender	80.785	1	80.785	9.510	.002
Error	1367.605	161	8.494		
PDI Sexual Behavior					
Intercept	2186.296	1	2186.296	198.654	.000
Gender	129.358	1	129.358	11.754	.001
Error	1771.897	161	11.006		
PDI Self-Care					
Intercept	612.646	1	612.646	105.349	.000
Gender	23.329	1	23.329	4.011	.047
Error	936.283	161	5.815		
PDI Life Support					
Intercept	506.167	1	506.167	80.226	.000
Gender	25.197	1	25.197	3.994	.047
Error	1015.797	161	6.309		

Table 20. Gender Differences for Function at Six Month Follow-Up

Measure	Women (N=135)		Men (N=28)		Between Subjects	
	Mean	SD	Mean	SD	F	<i>p</i>
Depression	17.99	12.3	20.54	12.3	1.488	.229
Anxiety	13.50	9.9	12.54	8.3	2.303	.131
Stress	18.31	1.2	19.41	9.6	3.697	.056
Pain	6.54	1.9	7.07	1.7	1.265	.162
Function	43.03	11.0	42.54	11.3	7.372	.007*
PDI Family/Home	3.74	2.36	4.53	2.60	2.510	.115
PDI Recreation	3.99	2.68	5.82	2.51	11.106	.001*
PDI Social Activity	3.37	2.53	5.00	2.94	9.088	.003*
PDI Occupation	4.45	2.94	6.31	2.77	9.510	.002*
PDI Sexual Behavior	3.67	3.30	6.04	3.43	11.754	.001*
PDI Self-Care	2.07	2.34	3.07	2.73	4.011	.047
PDI Life Support	1.81	2.43	2.86	2.88	3.994	.047

**p* denotes a significant difference of $p < .01$ for men's and women's' scores at six month follow-up

Table 21. Levene's Test of Homogeneity of Variance

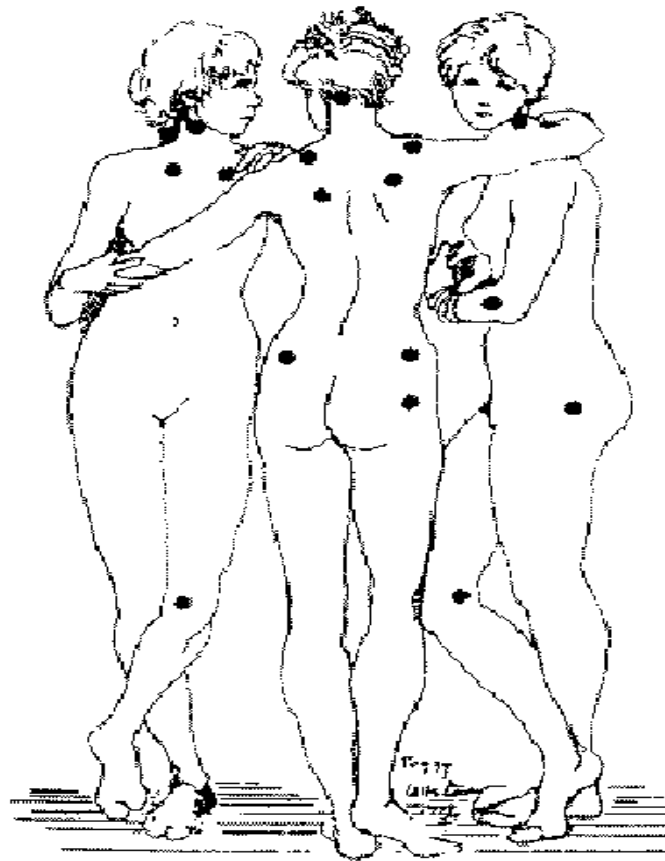
	F	DF1	DF2	Significance
Depression Admission	.003	1	161	.956
Depression Discharge	.737	1	161	.392
Depression 6 Months	3.175	1	161	.077
Anxiety Admission	1.108	1	161	.294
Anxiety Discharge	1.170	1	161	.281
Anxiety 6 Months	3.095	1	161	.080
Stress Admission	1.250	1	161	.265
Stress Discharge	1.743	1	161	.189
Stress 6 Months	.279	1	161	.598
Pain Admission	.867	1	161	.353
Pain Discharge	1.594	1	161	.209
Pain 6 Months	.055	1	161	.814
Function Admission	.000	1	161	.990
Function Discharge	.128	1	161	.721
Function 6 Months	.366	1	161	.546
PDI-Family/Home 6 Months	.149	1	161	.700
PDI-Recreation 6 Months	.502	1	161	.480
PDI-Social Activity 6 Months	1.861	1	161	.174
PDI-Occupation 6 Months	.314	1	161	.576
PDI-Sexual Activity 6 Months	.000	1	161	.986
PDI-Self-Care 6 Months	1.310	1	161	.254
PDI-Life Support 6 Months	1.497	1	161	.223

Table 22. Gender Differences for Discharge to Six Months When Controlling for Admission Scores Using Linear Contrasts

	Type III SS	Df	Mean Square	F	Sig.
Depression					
Time	87.702	1	87.702	1.472	.227
Gender	327.428	1	327.428	3.272	.072
Depression Admission	5586.776	1	5586.776	55.828	.000
Time * Gender	56.973	1	56.973	.956	.330
Error (Time)	9535.566	159	59.597		
Anxiety					
Time	2.366	1	2.366	.090	.765
Gender	110.729	1	110.729	2.211	.139
Anxiety Admission	3948.275	1	3948.275	78.839	.000
Time * Gender	68.112	1	68.112	2.584	.046
Error (Time)	4218.046	159	26.363		
Stress					
Time	17.933	1	17.933	.342	.559
Gender	107.820	1	107.820	1.573	.212
Stress Admission	6429.126	1	6429.126	93.769	.000
Time * Gender	179.970	1	179.970	3.346	.066
Error (Time)	8379.626	159	52.373		
Pain					
Time	1.508	1	1.508	.466	.496
Gender	.016	1	.016	.003	.959
Pain Admission	119.285	1	119.285	20.215	.000
Time * Gender	3.040	1	3.040	.940	.334
Error (Time)	517.761	159	3.236		
Function					
Time	58.008	1	58.008	.582	.447

Gender	2122.022	1	2122.022	9.594	.002
Function Admission	3543.355	1	3543.355	16.019	.000
Time * Gender	812.387	1	812.387	8.148	.005
Error (Time)	15952.752	159	99.705		

Figure I. Tender point locations for the American College of Rheumatology 1990 criteria for the classification of fibromyalgia



APPENDIX A

PAIN DISABILITY INDEX

Pain Disability Index: The rating scales below are designed to measure the degree to which aspects of your life are disrupted by chronic pain. In other words, we would like to know how much pain is preventing you from doing what you would normally do or from doing it as well as you normally would. Respond to each category indicating the overall impact of pain in your life, not just when pain is at its worst.

For each of the 7 categories of life activity listed, please circle the number on the scale that describes the level of disability you typically experience. A score of 0 means no disability at all, and a score of 10 signifies that all of the activities in which you would normally be involved have been totally disrupted or prevented by your pain.

Family/Home Responsibilities: This category refers to activities of the home or family. It includes chores or duties performed around the house (e.g. yard work) and errands or favors for other family members (e.g. driving the children to school).

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Recreation: This disability includes hobbies, sports, and other similar leisure time activities.

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Social Activity: This category refers to activities, which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social functions.

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Occupation: This category refers to activities that are part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer.

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Sexual Behavior: This category refers to the frequency and quality of one's sex life.

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Self-Care: This category includes activities, which involve personal maintenance and independent daily living (e.g. taking a shower, driving, getting dressed, etc.)

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

Life-Support Activities: This category refers to basic life supporting behaviors such as eating, sleeping and breathing.

No Disability 0__ 1__ 2__ 3__ 4__ 5__ 6__ 7__ 8__ 9__ 10__ Worst Disability

APPENDIX B

DEPRESSION, ANXIETY, AND STRESS SCALES-42

Please read each statement and circle a number 0, 1, 2, or 3 which indicates how much the statement applied to you **over the past week**

The rating scale is as follows:

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time.

2 Applied to me a considerable degree, or a good part of the time.

3 Applied to me very much, or most of the time.

1. I found myself getting upset by quite trivial things	0	1	2	3
2. I was aware of dryness of my mouth	0	1	2	3
3. I couldn't seem to experience any positive feeling at all	0	1	2	3
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5. I just couldn't seem to get going	0	1	2	3
6. I tended to over-react to situations	0	1	2	3
7. I had a feeling of shakiness (e.g., legs going to give way)	0	1	2	3
8. I found it difficult to relax	0	1	2	3
9. I found myself in situations that made me so anxious I was most relieved when they ended	0	1	2	3
10. I felt that I had nothing to look forward to	0	1	2	3
11. I found myself getting upset rather easily	0	1	2	3
12. I felt that I was using a lot of nervous energy	0	1	2	3
13. I felt sad and depressed	0	1	2	3
14. I found myself getting impatient when I was delayed in any way (e.g., lifts, traffic lights, being kept waiting)	0	1	2	3
15. I had a feeling of faintness	0	1	2	3
16. I felt that I had lost interest in just about everything	0	1	2	3
17. I felt I wasn't worth much as a person	0	1	2	3
18. I felt that I was rather touchy	0	1	2	3
19. I perspired noticeably (e.g., hands sweaty) in the absence of high temperatures or physical exertion	0	1	2	3
20. I felt scared without any good reason	0	1	2	3
21. I felt that life wasn't worthwhile	0	1	2	3
22. I found it hard to wind down	0	1	2	3
23. I had difficulty in swallowing	0	1	2	3

24. I couldn't seem to get any enjoyment out of the things I did	0	1	2	3
25. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
26. I felt down-hearted and blue	0	1	2	3
27. I found that I was very irritable	0	1	2	3
28. I felt I was close to panic	0	1	2	3
29. I found it hard to calm down after something upset me	0	1	2	3
30. I feared that I would be "thrown" by some trivial but unfamiliar task	0	1	2	3
31. I was unable to become enthusiastic about anything	0	1	2	3
32. I found it difficult to tolerate interruptions to what I was doing	0	1	2	3
33. I was in a state of nervous tension	0	1	2	3
34. I felt I was pretty worthless	0	1	2	3
34. I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
36. I felt terrified	0	1	2	3
37. I could see nothing in the future to be hopeful about	0	1	2	3
38. I felt that life was meaningless	0	1	2	3
39. I found myself getting agitated	0	1	2	3
40. I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
41. I experienced trembling (e.g., in the hands)	0	1	2	3
42. I found it difficult to work up the initiative to do things	0	1	2	3

APPENDIX C

DEPRESSION, ANXIETY, AND STRESS SCALES-21

Please read each statement and **circle a number 0, 1, 2, or 3** which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time.

2 Applied to me a considerable degree, or a good part of the time.

3 Applied to me very much, or most of the time.

1. I found it hard to wind down	0	1	2	3
2. I had difficulty in swallowing	0	1	2	3
3. I couldn't seem to get any enjoyment out of the things I did	0	1	2	3
4. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
5. I felt down-hearted and blue	0	1	2	3
6. I found that I was very irritable	0	1	2	3
7. I felt I was close to panic	0	1	2	3
8. I found it hard to calm down after something upset me	0	1	2	3
9. I feared that I would be "thrown" by some trivial but unfamiliar task	0	1	2	3
10. I was unable to become enthusiastic about anything	0	1	2	3
11. I found it difficult to tolerate interruptions to what I was doing	0	1	2	3
12. I was in a state of nervous tension	0	1	2	3
13. I felt I was pretty worthless	0	1	2	3
14. I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15. I felt terrified	0	1	2	3
16. I could see nothing in the future to be hopeful about	0	1	2	3
17. I felt that life was meaningless	0	1	2	3
18. I found myself getting agitated	0	1	2	3
19. I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
20. I experienced trembling (e.g., in the hands)	0	1	2	3
21. I found it difficult to work up the initiative to do things	0	1	2	3
I have thoughts of killing myself	0	1	2	3

APPENDIX D
NUMERICAL RATING SCALE

Please rate your usual level of pain on a scale of 0 to 10

0 1 2 3 4 5 6 7 8 9 10

0 – No Pain

10 – The worst pain you can imagine